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09/993,660	11/27/2001	Toshio Sakai	OHTN:011	8055

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EXAMINER
YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
1774	6

DATE MAILED: 08/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-6

Office Action Summary	Application No.	Applicant(s)	
	09/993,660	SAKAI ET AL.	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1774	

-- Th MAILING DATE of this communication appears on the cov r sheet with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 June 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

1. This Office action is in response to Applicants' amendment filed June 09, 2003 (Paper No. 5), which amends claims 1, 5-9 and 11, and provides substitute tables for pages 11, 13 and 14 of the specification.

Claims 1-11 are pending.

2. Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitations imposed by the last two lines of claim 1 are not clear because the scope of a "defect portion" is not clear. Other than crystallization and/or development of dark spots (as demonstrated by the comparative device example set forth in the present specification), it is not certain what is encompassed by "defect portion".

The limitations imposed by the last three lines of claim 11 are not clear when considered in light of the specification. The only explicit teaching pertaining to the limitations of claim 11 is at page 9, lines 15-20. It is the examiner's position that the teaching at page 9, lines 15-20 raises a question as to what applicants mean by "does not take part in a recombination of electrons and holes or in the formation of an excited state". Even if the energy gap of the bis-condensed aromatic cyclic compound is the same as or greater than the energy gap of the light emitting material, if the bis-condensed aromatic cyclic compound is capable of transporting electrons and/or holes, and/or is a compound capable of electroluminescence, the

bis-condensed aromatic cyclic compound will inherently play a role in the recombination of electrons and holes, and/or in the formation of an excited state.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-4, 6, 8, 9 and 11 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Inoue et al. (US 5,635,308).

See the whole patent. In particular, see column 1, line 66-c. 3, l. 37, the specific formulae set forth in c. 7-30, c. 30, l. 46-c. 31, l. 3, and c. 32, l. 50-54.

Inoue et al. disclose organic electroluminescent (EL) devices comprising a phenylanthracene derivative in the light emitting layer of the device. The phenylanthracene derivatives are bis-condensed aromatic cyclic compounds that are bisanthracene compounds.

As taught at c. 30, l. 46-c. 31, l. 3, another luminescent material may be used in the light emitting layer in combination with a phenylanthracene derivative. This additional luminescent material meets the limitation of a light emitting material as required by claims 1-4, 6, 8, 9 and 11. In addition, the phenylanthracene derivatives themselves are light emitting materials and meet the limitations of the light emitting material as required by claims 1-4, 6, 8 and 9.

Various of the formulae set forth in c. 7-30 of the prior art represent compounds that meet the limitations of a compound represented by general formula (2) as defined in claim 6 while others represent compounds that meet the limitations of a compound represented by general formula (3) as defined in claim 8.

Claim 1 recites that the bis-condensed aromatic cyclic compound is a "substance for suppressing crystallization" and "does not cause a defect portion to occur at 85°C for at least 200 hours during driving of the device."

Inoue et al. utilize bis-condensed aromatic cyclic compounds such as compounds of present general formula (2) or general formula (3) in order to provide a device having "high reliability" that features "minimized...development or growth of local dark spots during operation" of the device (c. 2, l. 13-19). The device is said to be "resistant to heat and durable" (c. 3, l. 54-55). The compounds are capable of forming an amorphous film that can, in ambient air, "remain stable over one year without crystallization" (c. 3, l. 56-63) and can maintain "a stable amorphous state even above room temperature and over a long period of time" (c. 29, l. 46-49). The compounds have high melting points of about 200-500°C and high glass transition temperatures of about 80-250°C with the most preferred glass transition temperatures being in

the range of about 150-250°C (c. 29, l. 42-46). Inoue et al. set forth examples of devices that can be driven for over 5,000 hours without development or growth of local dark spots and current leakage.

As is apparent from Inoue's teachings, Inoue's compounds suppress crystallization. Although Inoue et al. do not explicitly disclose that the use of the compounds does not cause a defect portion (such as local dark spots) to occur at 85°C for at least 200 hours of driving, it is reasonable to expect that Inoue's compounds inherently provide this benefit. It is reasonable to expect that Inoue's compounds inherently provide the benefit based on Inoue's teachings that the compounds have high melting and glass transition temperatures, that films comprising the compounds can remain amorphous for extended periods of time at temperatures above room temperature, that devices comprising the compounds are resistant to heat, and that devices comprising the compounds can be driven for extended periods of time without development or growth of local darks spots.

In the alternative, it would have been within the level of ordinary skill of worker in the art at the time of the invention as a matter of routine experimentation to select specific compounds from among Inoue's compounds in order to optimize device characteristics. Inoue's teachings as a whole would have motivated one of ordinary skill in the art at the time of the invention to select compounds that would optimize the thermal stability of the device.

Claim 11 has been amended to depend from claim 2, which requires the light emitting material and the bis-condensed aromatic cyclic compound to be in the light emitting layer, and to require that the bis-condensed aromatic cyclic compound does not take part in a recombination

of electrons and holes or in the formation of an excited state. At c. 30, l. 46-c. 31, l. 3, Inoue et al. teach that by using a selected luminescent material in combination with Inoue's inventive compounds in the light emitting layer, the light emitted can be shifted to a longer wavelength side. This teaching implies that the energy gap of Inoue's inventive compounds is greater than the energy gap of the selected luminescent material. Given that page 9 of the present specification teaches that this energy gap relationship provides the effect required by claim 11, the prior art is considered to meet the limitations of claim 11.

6. Claims 1-5, 8, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (EP 0 836 366 A1).

Sakai et al. disclose organic electroluminescent (EL) devices. Sakai et al. disclose various bis-condensed aromatic cyclic compounds for use in the light emitting layer of the device. For example, see formulae (3)-(6), (14)-(16), (32)-(36), (45), (51)-(54) and (56)-(59) on pages 12-31. One or more of these compounds may be used in combination with one or more fluorescent substances in the light emitting layer. For example, see p. 32, l. 45-53.

The one or more fluorescent substances meets the limitation of a light emitting material as required by claims 1-4, 8 and 11. In addition, the bis-condensed aromatic cyclic compounds themselves are light emitting materials and meet the limitation of a light emitting material as required by claims 1-4, 8 and 9.

Each of the formulae referenced above represents a compound meeting the limitations of a compound represented by general formula (1) as set forth in claim 5.

Of the formulae referenced above, each of formulae (5), (6), (15), (34), (36) and (53) represents a bisanthracene compound as required by claim 4. Each of formulae (6), (34), (36) and (53) further represents a compound meeting the limitations of a compound represented by general formula (3) as set forth in claim 8.

With respect to the thickness limitation of claim 3, see the prior art at p. 37, l. 31-37 and p. 38, l. 12-13.

Claim 1 recites that the bis-condensed aromatic cyclic compound is a "substance for suppressing crystallization" and "does not cause a defect portion to occur at 85°C for at least 200 hours during driving of the device."

The prior art devices are said to have a long life and good thermal stability (e.g. see p. 2, l. 51-52). Sakai et al. teach that all the layers of the device must have a glass transition temperature of not lower than 75°C (e.g. see p. 33, l. 26-33). As one of ordinary skill in the art at the time of the invention would have known, the higher the glass transition temperature of the compound(s) used to make a layer of the device, the less likely the layer is to crystallize. Although Sakai et al. do not specifically teach selecting a compound that does not cause a defect portion to occur at 85°C for at least 200 hours during driving of the device, it would have been within the level of ordinary skill of worker in the art at the time of the invention as a matter of routine experimentation to select specific compounds from among Sakai's compounds in order to optimize device characteristics. Sakai's teachings as a whole would have motivated one of ordinary skill in the art at the time of the invention to select compounds that would optimize the thermal stability of the device.

Claim 11 has been amended to depend from claim 2, which requires the light emitting material and the bis-condensed aromatic cyclic compound to be in the light emitting layer, and to require that the bis-condensed aromatic cyclic compound does not take part in a recombination of electrons and holes or in the formation of an excited state. At p. 32, l. 45-53, Sakai et al. teach that the fluorescent substance is selected so that the energy gap of the fluorescent substance is smaller than the energy gap of the host compound (the bis-condensed aromatic cyclic compounds referenced above functioning as host compounds). Given that page 9 of the present specification teaches that this energy gap relationship provides the effect required by claim 11, the prior art is considered to meet the limitations of claim 11.

7. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (US 5,635,308) as applied above to claims 1-4, 6, 8, 9 and 11, further in view of Hosokawa et al. (US 5,536,949).

Inoue et al. disclose EL devices and teach the use of phenylanthracene derivatives such as those of present general formula (2) or (3) as light emitting materials in the light emitting layer. Inoue et al. teach that the phenylanthracene derivatives may be used in combination with each other and may be used as host materials in combination with other light emitting materials such as styryl series dyes. Inoue et al. also teach that the phenylanthracene derivatives may be used in mixtures with aromatic tertiary amines having hole injecting/transporting properties.

Inoue et al. do not explicitly teach combining a phenylanthracene derivative such as those of present general formula (2) or (3) with a light emitting material of general formula (1) as set forth in claim 5, with claims 7 and 10 dependent from claim 5.

Hosokawa et al. disclose compounds that meet the limitations of a compound of general formula (1) as set forth in claim 5. Some of the compounds are disclosed for use as a host material in the light emitting layer of an EL device while others are disclosed for use as charge injection auxiliary materials capable of enhancing charge injection properties and also functioning as a fluorescent dopant. Hosokawa et al. teach that an organic EL device having a light emitting layer in which a slight amount of one or more of the charge injection auxiliary materials is dispersed in a host material requires lower applied voltage and exhibits enhanced luminous efficiency and prolonged service life. For example, see the abstract, column 3, lines 46-67, c. 4, l. 22-c. 11, l. 22, the last formula in c. 13-14, the penultimate formula in c. 17-18, c. 25, l. 50-54, c. 26, l. 59-c. 27, l. 2 and c. 27, l. 28-c. 36, l. 38. The charge injection auxiliary materials represented by the last formula in c. 13-14 and the penultimate formula in c. 17-18 meet the limitations of a compound represented by general formula (1) as defined in claim 5, and other charge injection auxiliary materials meeting the limitations of a compound represented by present general formula (1) are suggested by Hosakawa et al. Various of the formulae set forth in c. 31-36 for Hosokawa's host materials also represent compounds meeting the limitations of a compound represented by general formula (1) as defined in claim 5.

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize a charge injection auxiliary material as taught by Hosokawa et al. as a dopant in Inoue's

organic EL device. One of ordinary skill in the art would have been motivated to use Hosokawa's charge injection auxiliary material as a dopant in Inoue's EL device by Hosokawa's teachings that the use of the charge injection auxiliary material as a dopant in a light emitting layer of an organic EL device improves device performance such as lowering the voltage required for device operation, enhancing luminous efficiency and prolonging service life. One of ordinary skill in the art would have reasonably expected that Hosokawa's charge injection auxiliary materials would be suitable dopants for a light emitting layer comprising a phenylanthracene derivative based on the teachings of the Inoue patent. In particular, Hosokawa's exemplary charge injection auxiliary materials include compounds that emit blue light and that generically are tertiary aromatic amines as well as styryl series compounds.

Further, it would have been a *prima facie* obvious modification to one of ordinary skill in the art at the time of the invention to utilize light emitting materials such as the host compounds disclosed by Hosokawa in combination with Inoue's phenylanthracene derivatives in the light emitting layer of an EL device. The combination of two known materials, known to be suitable for the same purpose, is considered to be *prima facie* obvious.

8. Applicants' arguments filed June 09, 2003 have been fully considered but they are not persuasive. Applicants' arguments are believed to be fully addressed in making the prior art rejections as set forth in this Office action.

9. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (703) 308-4413. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for all official faxes is (703) 872-9306. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (703) 872-9041.)

MRY
August 21, 2003

Marie R. Yamnitzky

MARIE YAMNITZKY
PRIMARY EXAMINER

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